



PX-2300

SELF-HEALING RING & MULTIDROP FIBER OPTIC MODEM

User's Manual



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1.0 INTRODUCTION

The Meridian Technologies' series PX-2300 Multidrop Fiber Optic Data Modems are designed to accept RS-232, RS-422, and 2 & 4 -wire RS-485 signals and optically transmit them in simple string and ring networks as well as in dual, counter-rotating, self-healing rings with dual masters for increased fault protection and redundancy. Up to 99 modems can be connected in a single network to provide almost unlimited connectivity. Applications include traffic signal control, industrial process controls, and SCADA networks.

The PX-2300M is the stand-alone or surface mount model while the PX-2300R is the rack mount unit that occupies two slots in a standard Meridian chassis.

The Meridian PX-2300 series modems are equipped with built-in self-diagnostics that monitor and report the status of each of the modems on the network and the fiber itself. This feature is unique to the PX-2300 modems and provides a significant advantage over competitive products. On the PX-2300M (surface mount modem) local access to the diagnostic information is via a large, easy to read, LCD display on the top of each modem.

The PX-2300 is also compatible with Meridian's SpectraSmart? PC Diagnostic network management system. SpectraSmart continuously monitors "real-time" data for Meridian equipment to determine the integrity and operational status of diagnostic -equipped fiber optic modems, optical interfaces, fiber, etc. (See section 6.2 for more details on SpectraSmart). Remote access to SpectraSmart diagnostics is available via an RS-232 interface to a computer. Access to the diagnostic information on the PX-2300R is available via the USB or RS-232 interface to Meridian's SpectraSmart software that resides on a standard computer.

The modems regenerate fiber optic signals and provide greater system loss budgets (and increased distance). Wide temperature operating range and isolated diagnostic RS-485 driver allow those modems in harsh environments where ground loops and EMI/RFI interference may occur.

2.0 NETWORK CONFIGURATIONS

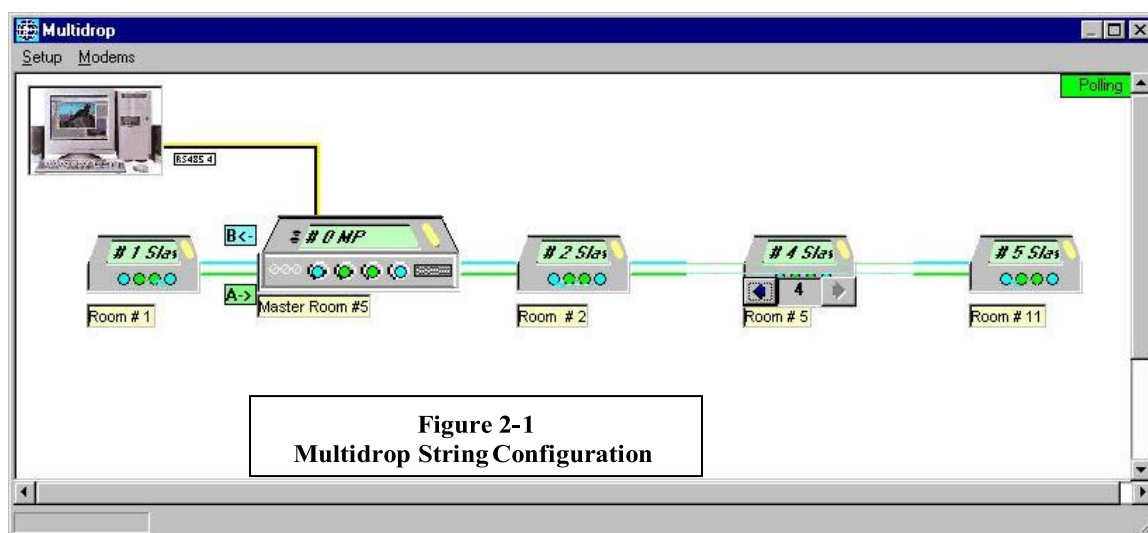
The PX-2300 modem is designed to connect central computers and controllers with multiple remote workstation / terminal units through fiber optic cables. The Master modem receives asynchronous data from the central computer or controller and transmits it over fiber optic cables to Slave modems at distances up to 30 miles (50 km) between the modems – using singlemode fiber. The PX-2300 modem supports RS-232

data with handshake, RS-485 data (2-wire or 4-wire) or RS-422 full duplex data at communication speeds up to 115 Kbps.

PX-2300 modems can be configured to operate in the following ways:

Multi-drop (Bus or String): Typical configuration for multi-modem applications including traffic controllers, railways & subways, and oil or gas pipelines where linear arrays of data communication nodes are required. Data from host (Master) is transmitted to all remote modems or slaves. The remote equipment addressed at the remote location will accept the data, perform the necessary function and transmit its data back to the master via the other remote modems between itself and the master.

Figure 2-1 below illustrates a typical string or bus configuration using one master and a number of remote or slave modems at various add/drop locations. Because of the dual optical paths, it is not necessary that the master be located at one end of the string or bus. Utilizing both clockwise and counter-clockwise optical paths allows slave modems to be placed on either side of the master providing added logistical flexibility.



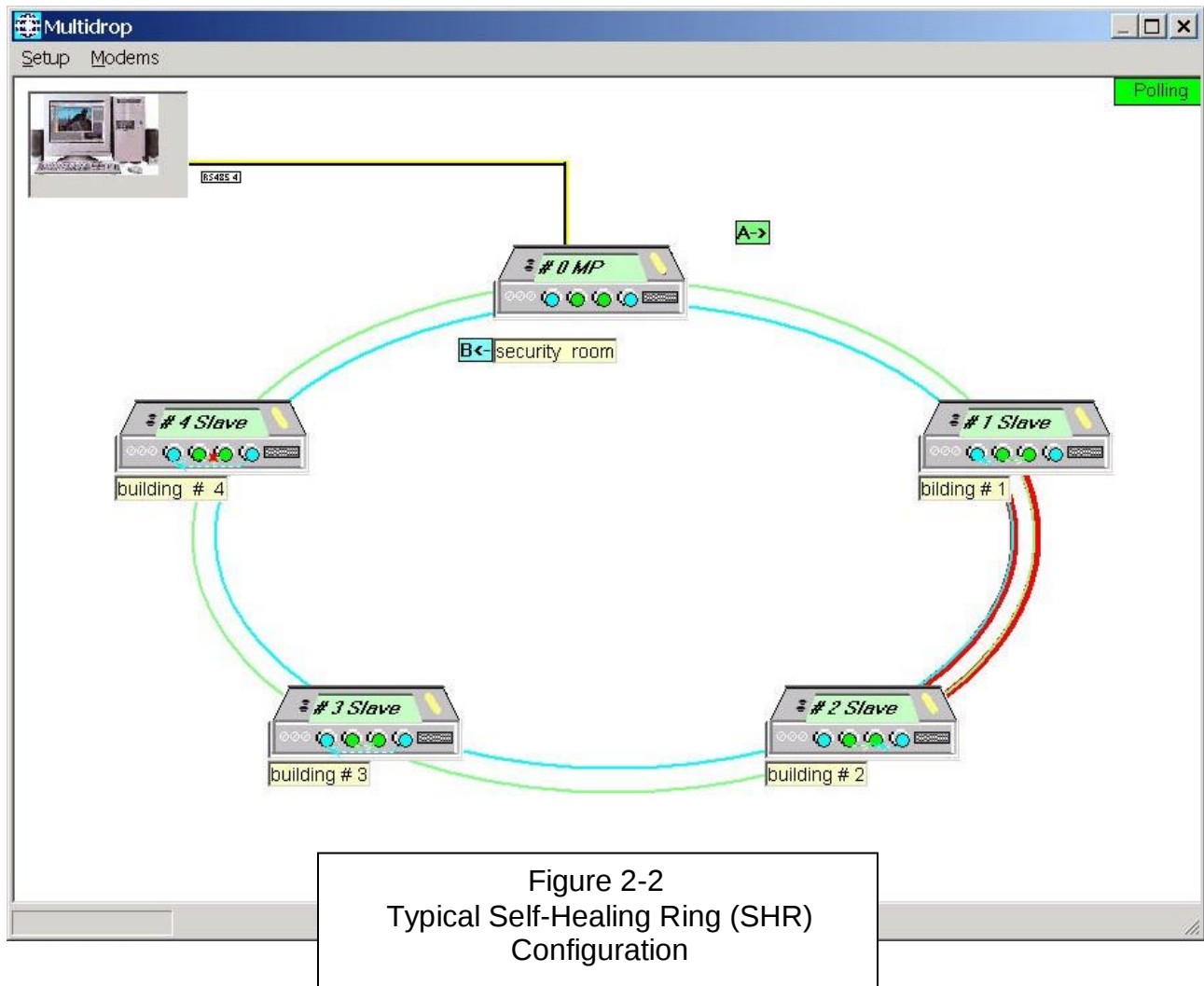
Self-healing ring: This configuration is the most complex one and highlights the various features of the PX-2300 modems. In such a network configuration, data is transmitted down both rings (one clockwise and the other counter-clockwise). In addition to the user's data, PX-2300 network and diagnostic commands are transmitted on the fibers. These signals are used to monitor the integrity of the fiber network and perform the necessary diagnostics and fail-safe network reconfiguration to ensure the fail-safe operation of the PX-2300 network. The PX-2300 also supports dual master modems for even greater protection and redundancy.

Figure 2-2 below illustrates how the PX-2300 modems can be configured in a SHR network. The head-end computer or controller is connected to the modem configured

as the master modem. Data from this master is then transmitted in both directions around the ring and dropped off at each of the remote or slave locations.

Since the customer's data is asynchronous, and not guaranteed to be present at all times, Meridian uses its proprietary network control/diagnostic signals to continuously monitor the network's integrity in both directions and provide network performance and fault location information back to the system controller.

The default transmit/receive direction for the data network's data is in the clockwise direction ('A' ring). In the event of a fiber break or modem failure, the modems automatically switch to the back up or counter-clockwise rotating 'B' ring to detect the network's data. Other SHR networks provide a simple local contact closure to indicate or alarm that the network has failed or gone into the self-healing mode of operation. Meridian's PX2300 modems provide this same local contact closure for compatibility but also, through the *SpectraSmart* network management system, provide both local and remote indication and identification of the fault – a major technology breakthrough and significant cost advantage to network management.



As shown above, the Meridian PX2300 series digital fiber optic data modems can be easily configured into string or ring networks. Key factors in their networking and expansion capabilities include the ability to drop, add or repeat channels at any modem without signal degradation. Commonly referred to as a “counter – rotating “ ring, the self-healing ring (SHR) architecture allows easy network expansion up to 99 slave modems, add or drop channels at any modem on the network and provide signal path redundancy

2.1 Self-healing ring

Self-healing ring with One Master

Figure 2-2 above illustrates how the SHR ring provides signal protection. A fiber break is shown on the primary ring ('A') between Slave #1 & Slave #2. The master detects the broken fiber ring and 'listens' to the network on the secondary ring. This secondary ring ('B') transmits data in the counter-clockwise direction from the master to all of the slaves and then back to the master – providing uninterrupted communications around the ring.

2.2 Self-healing ring with Dual Master

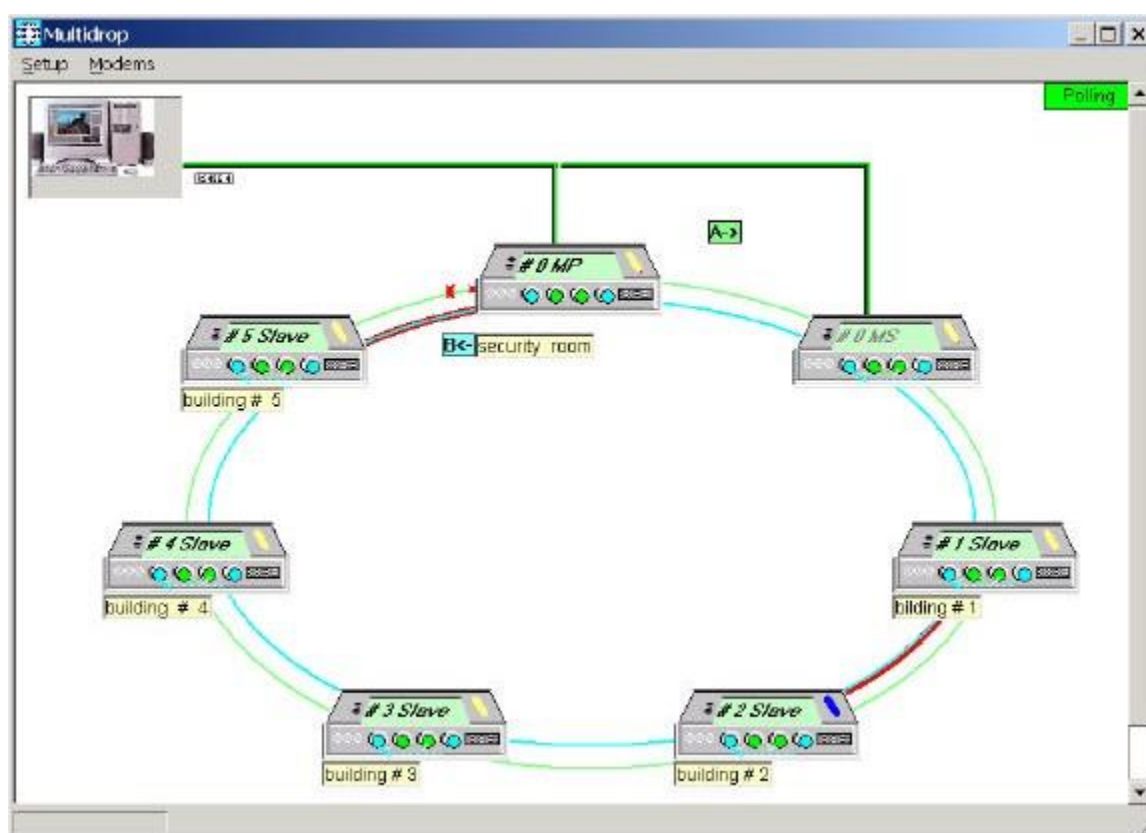


Figure 2-3
Typical Self-Healing Ring (SHR)
Configuration w/Dual Master

Self-healing ring with Redundant Masters

In a standard SHR with one master modem, this single master modem can represent a single-point failure. Unlike the redundant fiber ring, the failure of this single master will cause the entire network to fail. Figure 2-3 illustrates a similar SHR network that incorporates dual master modems (either surface or rack mount types). This dual master configuration eliminates the single-point failure associated with an individual master modem and provides an additional level of network protection and redundancy.

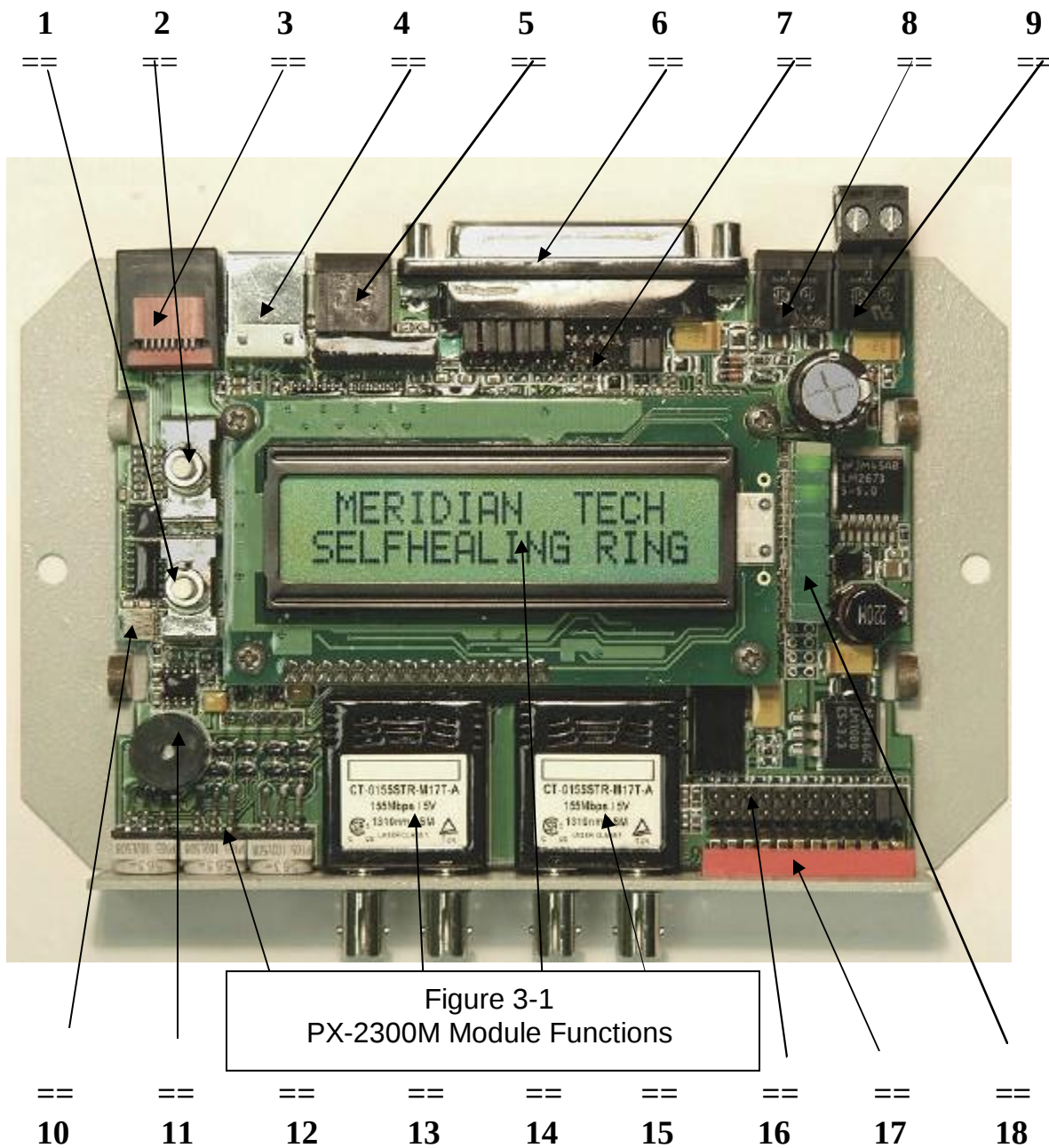
Under normal operation, one master is designated as the primary and all data communication initiates from it. If the primary master were to fail, the secondary master will take control of the network, again, providing uninterrupted service. Using Meridian's SHR diagnostic system, the status and integrity of both master modems, each of the slaves, and the entire fiber network will be monitored and reported back to each of the modems and to the control center – a feature unique to Meridian.

3.0 DESCRIPTION OF THE EXTERNAL CONTROL

3.1 PX-2300M – Surface Mount Unit

Figure 3-1 below shows a photograph of the circuit board and identifies each of the various I/O interfaces and the various function switches for module configuration.

Function	Description
1. Button 2	- button for submenu scrolling
2. Button 1	- button for main menu scrolling
3. Connector RJ45	- RS-232/485 interface for SpectraSmart PC diagnostic
4. Connector USB "B"	- USB interface for SpectraSmart PC diagnostic
5. Connector 2PIN	- alarm relay contact closure
6. Connector DB-25	- input / output data stream
7. Jumpers 1 - 12	- interface mode selected
8. 2-Pin Connector	- redundant power input (PWR B)
9. 2-Pin Connector	- main power input (PWR A)
10 Potentiometer	- LCD contrast adjust
11 Speaker	- audible alarm
12 Rotary switches	- modem address setting
13 Optic port 2	- transmit ring B – Tx B and receive ring A – Rx A
14. LCD	- liquid crystal display
15. Optic port 1	- transmit ring A - Tx A and receive ring B - Rx B
16. Jumpers 13 - 24	- anti-stream value
17. DIP switch	- configuration mode selected
18. LEDs	- electrical & optical status indicators



DIP SWITCH FUNCTION



DIP switch settings

SWITCH NO.	SETTING	
	ON (up position)	OFF (down position)
1	Master	Slave
2	Primary Master	Secondary Master
3	Ring Configuration	String / Bus Configuration
4	RS 232 Port Enabled	RS 232 Port Disabled
5	RS 422 Port Enabled	RS 422 Port Disabled
6	RS 485 (2 wire) Port Enabled	RS 485 (2 Wire) Port Disabled
7	RS 485 (4 wire) Port Enabled	RS 485 (4 Wire) Port Disabled
8	TTL Port Enabled	TTL Port Disabled
9	Remote Loop back Enabled	Remote Loop back Disabled
10	Local Loop back Enabled	Local Loop back Disabled
11	Buzzer Enabled	Buzzer Disabled
12	Anti Streaming Enabled	Anti Streaming Disabled

The 12-position DIP switch is located on the right side of the front panel.

The data format is selected by setting DIP switches 4 through 8. The available data formats are RS-232, RS-422, RS-485 (2-wire or 4-wire) and TTL.

The local audible alarm can be enabled/disabled by setting switch 11.

Anti-Streaming is enabled & disabled via switch 12.

The modem status (Master primary/secondary or Slave) and network configurations (string/ring) are set by switches 1, 2 & 3.

Please note that the position of these individual switches is detected when power is applied to the specific modem. If these positions are changed while the modem is operational, it will be necessary to reset the modem either by briefly removing power to the modem or (for a master modem) by using the pushbuttons to 'RESTART' the modems. This reset function properly configures the modem to any new settings that may have been changed.

3.2 Rotary switches

The three rotary switches located on the front of the modem are used by the internal diagnostics to properly identify and communicate with each modem (see Figure 3-2). Master modems can be set between 0 and 99 while each of the slave modems can be set from 1 to 99 (there is no #0 for slaves). Note that it is important to set the slaves using consecutive numbers starting from 1 (closest to the Master).

The switches are factory set to '000'. This position is identified by the arrows on the switches in the 9 O'clock position. A small slotted screwdriver is used to set these switches.

3.3 LEDs status

LED Modem Status Indicators

	LED IS GREEN	LED IS 'OFF'
ALARM	Normal operation	ALARM -- LED is red
POWER A	Power present	No power
POWER B	Power present	No power
MASTER	Operating as a Master	Slave
LINK A	Receiving Optical Signal	No signal present
LINK B	Receiving Optical Signal	No signal present
DIAG A	Receiving a diagnostic signal via Line A	No signal present
DIAG B	Receiving a diagnostic signal via Line B	No signal present
DATA 1T	Data present on input side of Transmitter	No data present
DATA 1R	Data present on output side of Receiver	No data present
DATA 2T	Data present on input side of Transmitter	No data present
DATA 2R	Data present on output side of Receiver	No data present

Notice: LEDs “DIAG A” or “DIAG B” are flashing when diagnostic data is going through line A or B. LEDs are “OFF” when diagnostic data is not flowing through these lines.

3.4 Rear connectors



- + - +

Rear side of the PX2300M

Input Data is connected to the modem via the DB-25 connector (DATA I/O) on the rear of the modem. Connections should be made following the information in Tables 1 and 4. The modem is equipped with dual power inputs (PWR A and PWR B). PWR A is the primary power input and will accept 12-24V AC or DC. Where redundant power sources are required you can connect the power supply to PWR B. This voltage should be less than or equal to the voltage applied to the PWR A input connector. A contact closure (C.C.) for both local and global alarms output is available at the 2-pin connector on the rear the side of the modem (See Specifications for contact details).

The RS-232 (RJ45) or USB “B” connectors are used to interface the modem to a standard Windows-based computer for operating the SpectraSmart PC diagnostics. An additional RS-485 (RJ45) port is available for interconnecting master modems either in the same ring (as a secondary master) or to primary master modems in other strings and/or rings. This connection allows all of the rings and/or strings to be connected to one host computer for the SpectraSmart PC diagnostics.

4.0 INTERNAL COMPONENT CONTROLS

There are two sets of jumpers inside the module that are used to set specific I/O characteristics of the RS-232 & RS-485 signals and also to set the anti-streaming value for each modem. Removing the top cover of the module accesses these jumpers.

4.1 Jumpers 1 – 12

Internal jumpers 1 - 12 define the data protocol interface and are located directly behind the 25-pin data connector on the rear of the module.

```

*      JP 1  2  3  4  5  6  7  8  9 10 11 12
      0  0  0  0  0  0  0  0  0  0  0  0
A      I  I  I  I  I  I
      0  0  0  0  0  0  0  0  0  0  0  0
B
      0  0  0  0  0  0  0  0  0  0  I  I
      0  0  0  0  0  0  0  0  0  0  0  0

```

Jumper	Driver	A	B
JP 1	RS-485 (diagnostic)	120 Ohm Rx	Hi – Z
JP 2	RS-485 (diagnostic)	120 Ohm Tx	Hi – Z
JP 3	RS-232	DCE	DTE
JP 4	RS-232	DCE	DTE
JP 5	RS-232	DCE	DTE
JP 6	RS-232	DCE	DTE
JP 7- JP10	Reserved		
JP 11	RS-485	120 Ohm In	Hi – Z
JP 12	RS-422	120 Ohm In	Hi – Z

- Hi – Z** - high impedance
DTE - data terminal equipment (computer terminal handshaking)
DCE - data communications equipment (modem handshaking)
***** - default factory setting of Jumpers

Input/Output termination resistors are usually necessary for RS-422 and RS-485 applications. Without proper termination, the error rate of data transmission may be high due to an “echo” effect on the electrical connection. With the addition of a termination resistor at the beginning or at the end of the electrical bus, this “echo” effect is greatly reduced. The termination resistors are 120ohm resistors are located inside the modem. Termination resistors are not required for RS-232 applications.

4.2 Jumpers 13 - 24 (Antistreaming values)

In order to prevent the network from ‘hanging-up’ in the event that one of the modems or ports continues to transmit data on its own, the modems in the network can be set to terminate transmission after a specified time-out (or Antistreaming time). Jumpers 13 through 24 are used to set the appropriate timeout interval. This time can be set to 10ms, 0.1sec, 2sec, 30sec (see the table below for proper jumper settings for the desired timeout interval. This set of jumpers is located under the top cover directly in front of the front panel DIP switches.

JP	13	14	15	16	17	18	19	20	21	22	23	24
	0	0	0	0	0	0	0	0	0	0	0	0
											I	I
	0	0	0	0	0	0	0	0	0	0	0	0

JP 13 - JP 22	- -	Reserved
JP 23	ON	Antistream
JP 24	ON	30 sec *
JP 23	OFF	2 sec
JP 24	ON	
JP 23	ON	0.1 sec
JP 24	OFF	
JP 23	OFF	10ms
JP 24	OFF	

* - Factory setting of Jumpers 23 -24

4.3 LCD contrast potentiometer (PX-2300M only)

The contrast of the LCD display can be adjusted by the potentiometer located on the left side near button #1. It is accessible through the hole on the left side of the modem.

5.0 INSTALLATION

Following these instructions, the installation of the PX-2300 relatively simple and requires no adjustments and a minimal amount of switch settings.

5.1 Master/Slave configuration

Unless otherwise requested, all modems are shipped from the factory set as Slaves. To set the modem to the 'Master' mode of operation, the DIP switch on the front panel must be moved from the 'Slave' to the 'Master' position (see the appropriate table in Section 3.1). For PX-2300M firmware version 3.12 and earlier, if the Master modem is connected to a computer for diagnostic purposes, it is necessary to remove the modem cover and set the 3-pin jumper near the 'menu' button # 1 to the opposite position.

Slave Master

5.2 Modem addresses

In order for the system diagnostics to properly connect to and interrogate the modems, it is necessary to set each modem to its proper address. Master and Slave modems can be set from 0 to 99 and 1 to 99, respectively. This is done by setting the three rotary switches on the front of the modem as mentioned in Section 3.2 for the shelf mount modems and Section 7.0 in reference to the rack mount modems. In the case of multiple strings or rings connected to the same diagnostic computer, the interconnected master modems (via the RS-485 bus) must be numbered consecutively starting from '00'. Please note that it is necessary to start with the address number '00' for the master modems. In a network with dual master modems (primary and secondary) both master modem addresses must be set to the same address. Slave modem addresses must begin with address #1 in both ring & string networks. These slave modem addresses should be consecutively addressed starting from the master and going in the clockwise direction around a typical 'ring' network (see Fig.2).

In a string network the Master modem does not need to be located at one end of the string and, in fact, can be located at any convenient place in the network. It is not recommended to use multiple master (primary & secondary) modems in a string network. Slave numbering should continue on the left side of the network (starting with the modem closest to the master).

Note: If there is a conflict or duplication of the address of master modems in a single network connection to the computer, SpectraSmart will display the error "Connection

is not reliable" then trying to start the software. To correct this, please check the address of all master modems mounted in the same chassis or connected via the RS-485 cable #2 (see Figure 7.3) to ensure that they are all unique. Also note that the computer interface cable must be connected to the master modem whose address is set to '000'.

5.3 Connection to the diagnostic computer

As previously mentioned, the Master modem is connected to the diagnostic computer via the RS-232 or USB ports on the surface mount modems (PX-2300M). Rings with both primary and secondary Master modems use the RS-485 connector to interconnect these master modems together. Only the primary Master modem needs to be connected to the diagnostic computer. Diagnostic communication will then be through the Primary Master modem only. The PX-2300M modem (surface mount) and the PX-2300R rack mount modem use either USB or RS-232 interfaces for connection to the diagnostic computer.

5.4 Power supply

The PX-2300M, surface mount modems are equipped with dual inputs that will accept 12-24V AC or DC. The recommended power supply is Meridian's WP-12A, a 12VAC power supply. The primary power source is connected to the 'PWR A' connector. Where available, a redundant power source can be connected to the 'PWR B' input connector. Please note that the input voltage of the redundant power source must be equal to or less than the voltage of the primary voltage source. If the primary power source is lost the SpectraSmart diagnostic system on the host computer will display the message: "Power input PWR A is not established".

6.0 SYSTEM TESTING

There are two ways to perform system testing and network diagnostics. Network 'quantitative' testing can be done with the use of the local and remote loop-back testing (in conjunction with a BERT test equipment unit or by using "Hyper Terminal" on your computer. The other is by using the PX-2300's built-in network diagnostic system.

6.1 Loopback testing

Loop back testing will check the modem's actual RS-232 data channel interface. The PX-2300 modem offers two loop back options to check data communications:

- Local loop-back
- Remote loop-back

Local loop-back can be achieved by connecting the PX-2300 modem to a Bit Error Rate Tester (BERT) or with the use of your computer's Hyper Terminal application program.

See Figure 6-1.

To enable the local loop back function on the modem, set DIP switch 10 on the front panel of the modem to the ON position. Electrical connections to the modem are determined to be normal if data communications is within the specified BER.

To enable the remote loop back feature, set DIP switch 9 on the front panel of the modem under test to the ON position. If data communications are within the required specification, perform this operation on each modem in the ring until the trouble is found.

Note: that it is necessary that the data protocol for each modem be set to the same data protocol that the test set is configured. For example, Hyper Terminal will utilize the RS-232 channel for communications. Each modem in the ring or string needs to be set for RS-232. Since the modem will support 2 channels of RS-232, local & remote loop-back testing can be done on each channel independently (Ch 1 on pins 2 & 3, Ch 2 on pins 3 & 4). The test equipment (BER or Hyper Terminal) is connected to the DB25 connector on the master modem in each string or ring. It's important to ensure that the electrical connectivity between the computer and the modem is correct (TX to RX and Rx to TX pin connectivity).

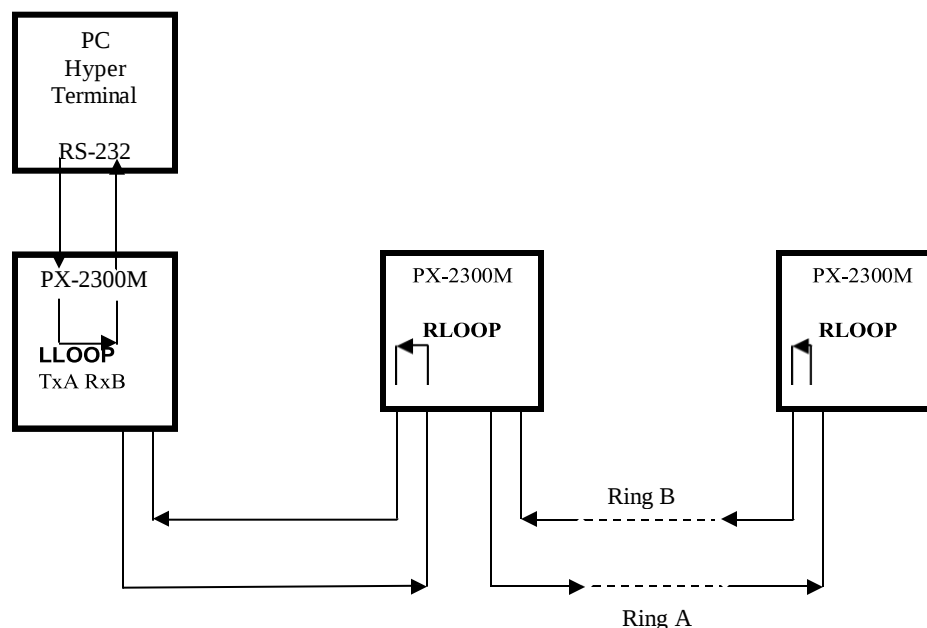


Fig. 6-1
Loop Back Operation

6.2 Onboard SpectraSmart Network Local Diagnostics

The PX-2300M modem is equipped with built in self-diagnostics that are accessed through the LCD display and the two small push buttons on the top face of the module. These buttons are used for scrolling through the menu functions of the LCD display (PX-2300M).

Each modem can display its own parameters as well as the operational status of the ring or string (Fig.6 -2 to 6-20). Parameters of any Slave modem on the ring/string can be viewed by its Master PX-2300M modem (Fig. 6-17 – 6-20). Parameters viewable on the LCD display are: internal modem temperature, power supply voltages, optical ring status, alarm history, software revision and various other parameters.

If one of the modem's operational parameters exceeds its critical level, a flashing light and audible alarm (if turned on) are activated at that modem. This information can be polled at the master modem using either the internal diagnostics (PX- 2300M) or via the SpectraSmart software in conjunction with the PX-2300R. Both primary and secondary (redundant) rings are monitored simultaneously by the self- diagnostics. If the primary ring is broken, the LCD will display the location of the break (between which two locations) providing the ability to quickly identify and isolate the fault location.



Fig. 6-2



Fig.6-3



Fig.6-4



Fig. 6-5



Fig. 6-6



Fig.6-7



Fig. 6-7



Fig.6-8



Fig. 6-9



Fig.6-10



Fig.6-11

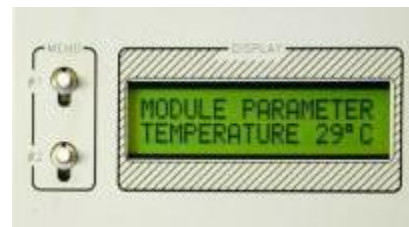


Fig.6-12



Fig.6-13

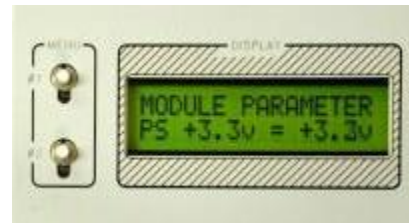


Fig.6-14



Fig.6-15



Fig.6-16



Fig.6-17



Fig.6-18



Fig.6-19

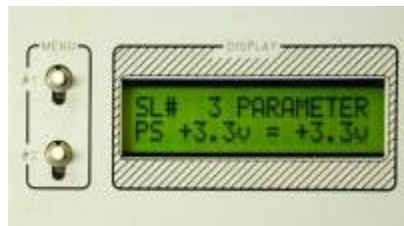


Fig.6-20

7.0 PX-2300R Rack Mount Modem

The PX-2300R is the rack mount version of the PX-2300M surface mount module and is functionally equivalent to the PX-2300M with the exception of the LCD display. Access to the network diagnostics on the PX-2300R is via the RS-232 or USB interfaces to a computer running SpectraSmart NMS.

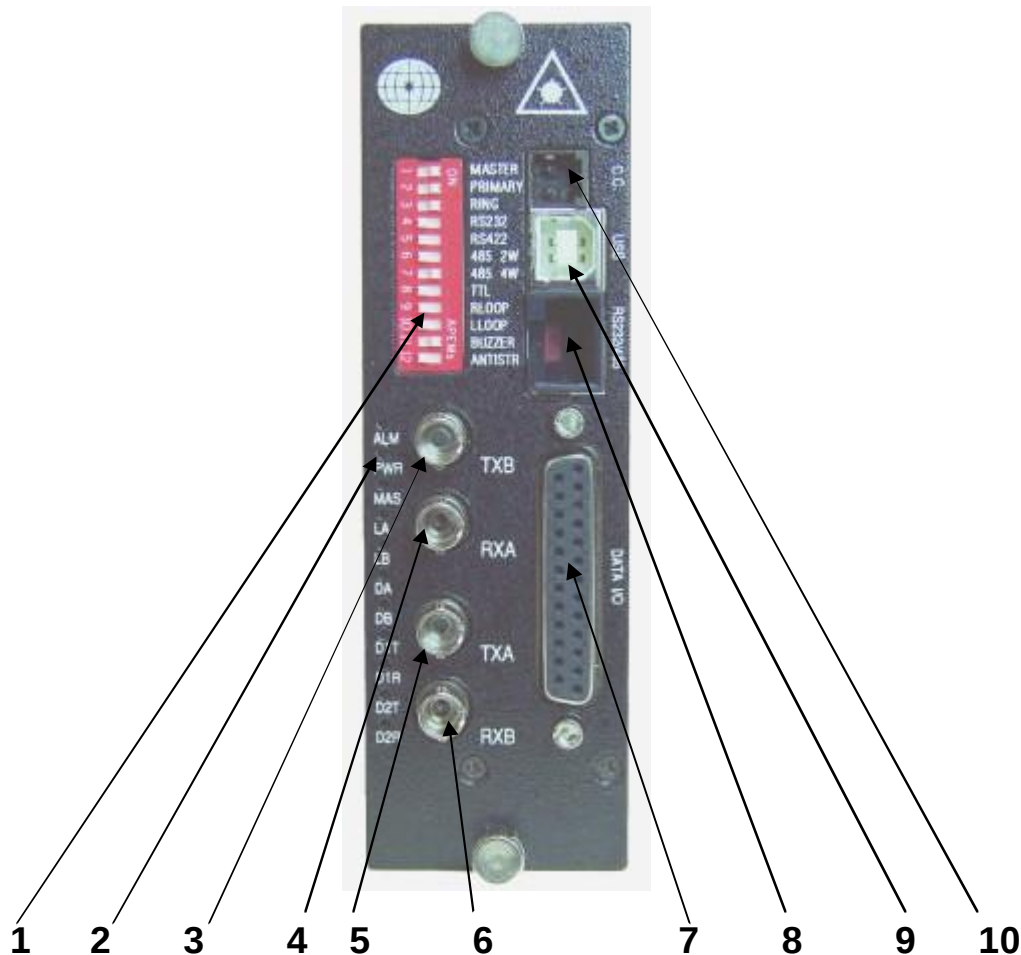


Fig. 7-1
PX-2300R Front Panel Layout

- | | |
|--------------------|--|
| 1. DIP switch | - configuration mode selected |
| 2. LEDs | - indicate the status of electrical and optical signal |
| 3. Optic port B | - transmit line B - TX B |
| 4. Optic port A | - receive line A - RX A |
| 5. Optic port A | - transmit line A - TX A |
| 6. Optic port B | - receive line B - RX B |
| 7. DB-25 connector | - electrical input /output data (DATA I/O) |
| 8. Connector RJ45 | - RS-232/RS-485 driver for SpectraSmart PC diagnostic |
| 9. Connector USB | - USB driver for SpectraSmart PC diagnostic |
| 10. Connector 2PIN | -alarm relay contact closure |

See Sections 3 & 4 for LED indicator status, DIP & rotary switches and jumpers settings.

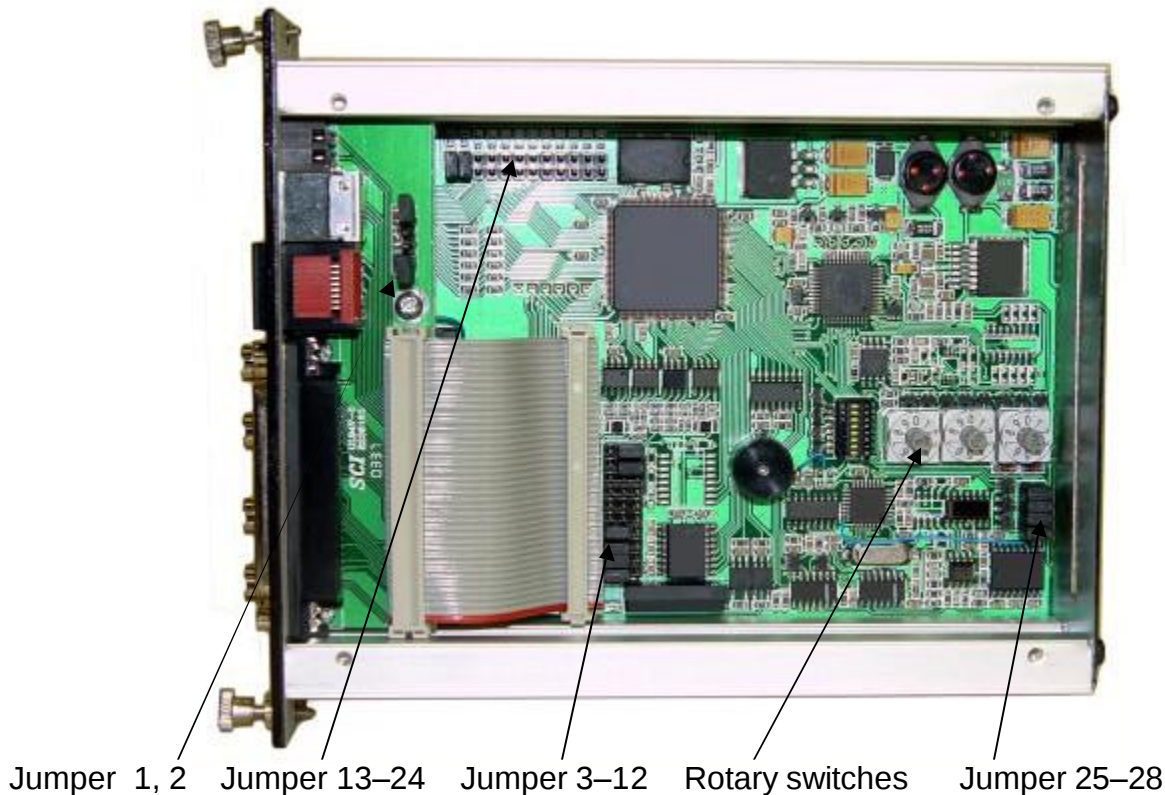


Fig.7-2
PX-2300R Side View

PX-2300R modem has front-panel mounted RJ45 and USB for connection to the computer for SpectraSmart diagnostics and an RJ45 connector for the RS-485 interface to other PX-2300R modems.

There are two different methods for interconnecting the diagnostics of more than one master PX-2300R modem. Figure 7 -3 illustrates how the diagnostics from each modem are connected together. If the only diagnostic card is the PX-2300R, this figure illustrates how to connect the diagnostics back to the computer (either via the RS-232 or USB ports). If more than one master PX-2300R modem is housed in the same chassis, the diagnostic information communicates with each of the modems via the chassis backplane. No other interconnect cables are required.

If additional PX-2300R master modems are installed in expansion chassis, a cable as shown in Figure 6-2 must be connected between one of the master modems in the master chassis (subrack) and one in the expansion chassis (subrack) (Cable type #2). This cable acts serves to communicate the diagnostic information for each of the master PX-2300R modems with that in the master chassis (SR-2000/S1-PC). Also,

since these modems are configured as master modems, jumpers 25-28 on each of the modems must be installed.

If the PX-2300R is inserted in a Meridian diagnostic subrack (SR-2000/S1-PC) with communication and interface cards, it is necessary to connect Cable #3 between the RS-485 (RJ45) port on the PX-2300R and the communication card (RJ11) on the SpectraSmart chassis. SpectraSmart will then discover and identify the PX-2300R as a Master module in a ring or string configuration, depending on module switch settings

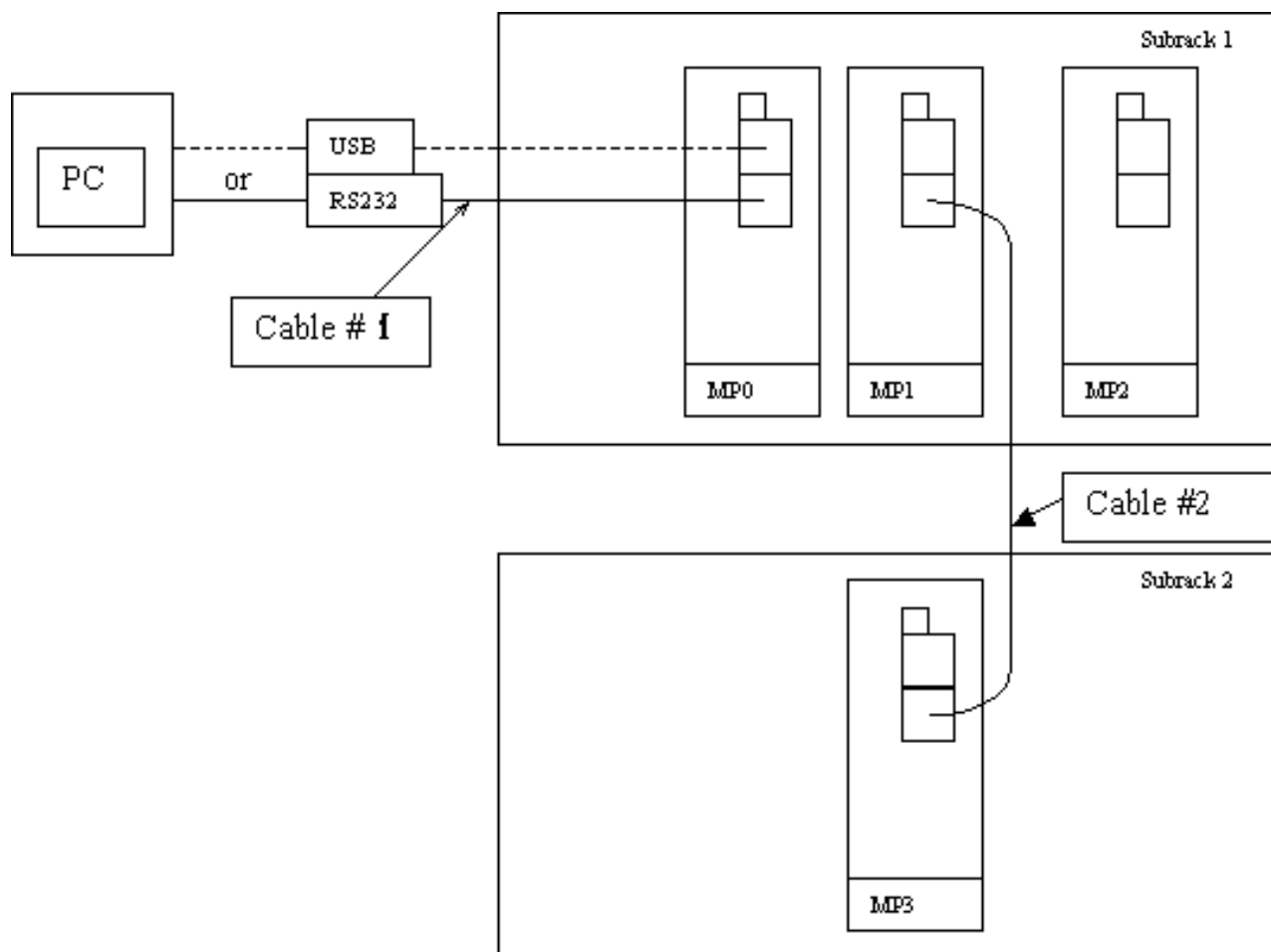


Fig. 7-3
SpectraSmart Diagnostic Interface from PX-2300R to Computer

To monitor the PX-2300R using SpectraSmart PC, the card should be configured as a Primary Master modem with an address of "0". PX-2300R has two connectors to interface with the computer. The top connector is an RJ45 for the RS-232 interface while the second connector is a standard USB connector.

7.1 PX-2300R Jumper Setting:

The function of the jumpers in the PX-2300R as identified in Figure 7-2 are identical to the jumpers on the PX-2300M surface mount modem.

Refer to Section 4.0 for more information regarding the jumper settings. They are the same as in the PX-2300M module, with the exception of Jumpers 1 & 2. These jumpers are located on another section of the circuit board.

JP1 – RS-485 (diagnostic) – 120 ohm Rx

JP2 – RS-485 (diagnostic) – 120 ohm Tx

J1	J2	
0--0	0 0	0--0
0	0--0	0--0 0
J1	J2	

Hi-Z *

120 Ohm

* - Default factory setting of Jumpers 1, 2

7.2 USB Port Configuration

If you are going to connect the diagnostic computer to the PX-2300R USB port, please following these instructions for proper installation of the USB drivers (FTDI Virtual COM Port - VCP):

1. Turn power on the Subrack and PC;
2. Plug in the USB cable. This should bring up Found New Hardware Wizard;
3. Insert SpectraSmart installation CD and click Next;
4. Click "Search for a suitable driver for my device (recommended)", select Next;
5. Click CD-ROM drive, select Next;
6. If the Wizard found the driver, click Next, and then Finish.
7. If the Wizard did not find the driver, click Back, then click "Specify a location", then Browse and find folder 'Drivers' on CD-ROM drive (usually D: or E:), select Next;
8. If the Wizard found the driver, click Next, and then Finish.

If SpectraSmart had been in use previously with the RS-232 port & driver, it will be necessary to change the Port in PC Registry. DO NOT TURN OFF THE SUBRACK. In the computer click Start -> Settings -> Control Panel -> System -> Hardware -> Device Manager. Click + near Ports. In the list under Ports find USB (COMX), where X is number of virtual COM Port. Usually it is COM3 or COM4.

Start SpectraSmart PC program. When the Copyright screen appears click "Ctrl+P". A "Choose Port #" window will come up. Select the "X COM Port", captured by USB that was previously identified and click 'OK'.

8.0 SpectraSmart PC Network Management System



The PX-2300 multidrop modems are SpectraSmart compatible for remote diagnostic network management of the associated strings & rings. Using the RS-232 or USB ports, SpectraSmart collects real-time data from the network modems, fiber connectivity, modem operational status, etc and presents it on the computer in a GUI format for easy network viewing and network fault identification.

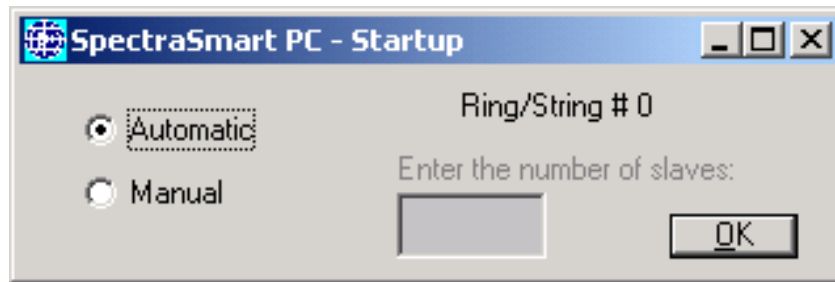
The PC based SpectraSmart software has these additional capabilities over the embedded modem self-diagnostic:

- Simultaneously monitors several rings and strings
- Recognizes multiple network faults.
- Collects, displays and monitors all operational parameters from each modem
- Records complete network alarm history
- Displays real-time graphical display of any remote modem (position of switches, front panel lights, etc.)
- Calculates current Bit Error Rate (BER) for each network string/ring

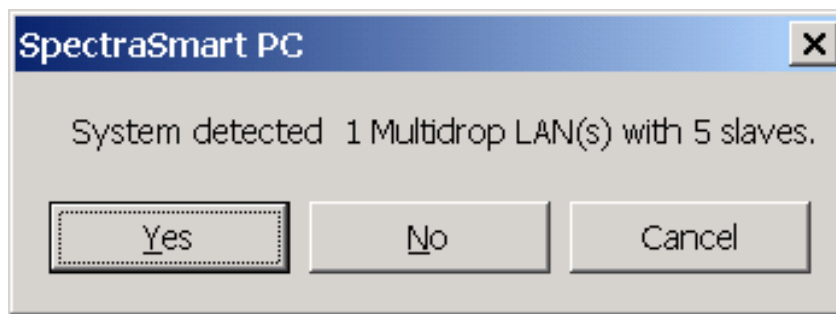
As an example, when a broken fiber is detected, the network display will show a flashing **red** fiber between the two modems where the broken fiber is located. This provides the user with an instant indication of a fiber fault, even though the network

will continue to operate properly (SHR network architecture). This information is also available on the LCD display on each remote modem (PX-2300M).

SpectraSmart PC has two options for starting the software: Automatic and Manual.



In the **Automatic mode** the system automatically detects the number of slaves on the network. The detection process starts after entering the user password. Once detected, the message "System detected N Multidrop LANs with M slaves". Three buttons "Yes", "No" and "Cancel" appear.



1. Click "Yes", if you agree and the next window appears.
2. Click "No", if you disagree and the system will interrogate the network again. Please check the modems to ensure that they have been turned on and interconnected with the network fiber.
3. Click "Cancel" if you want to leave SpectraSmart.

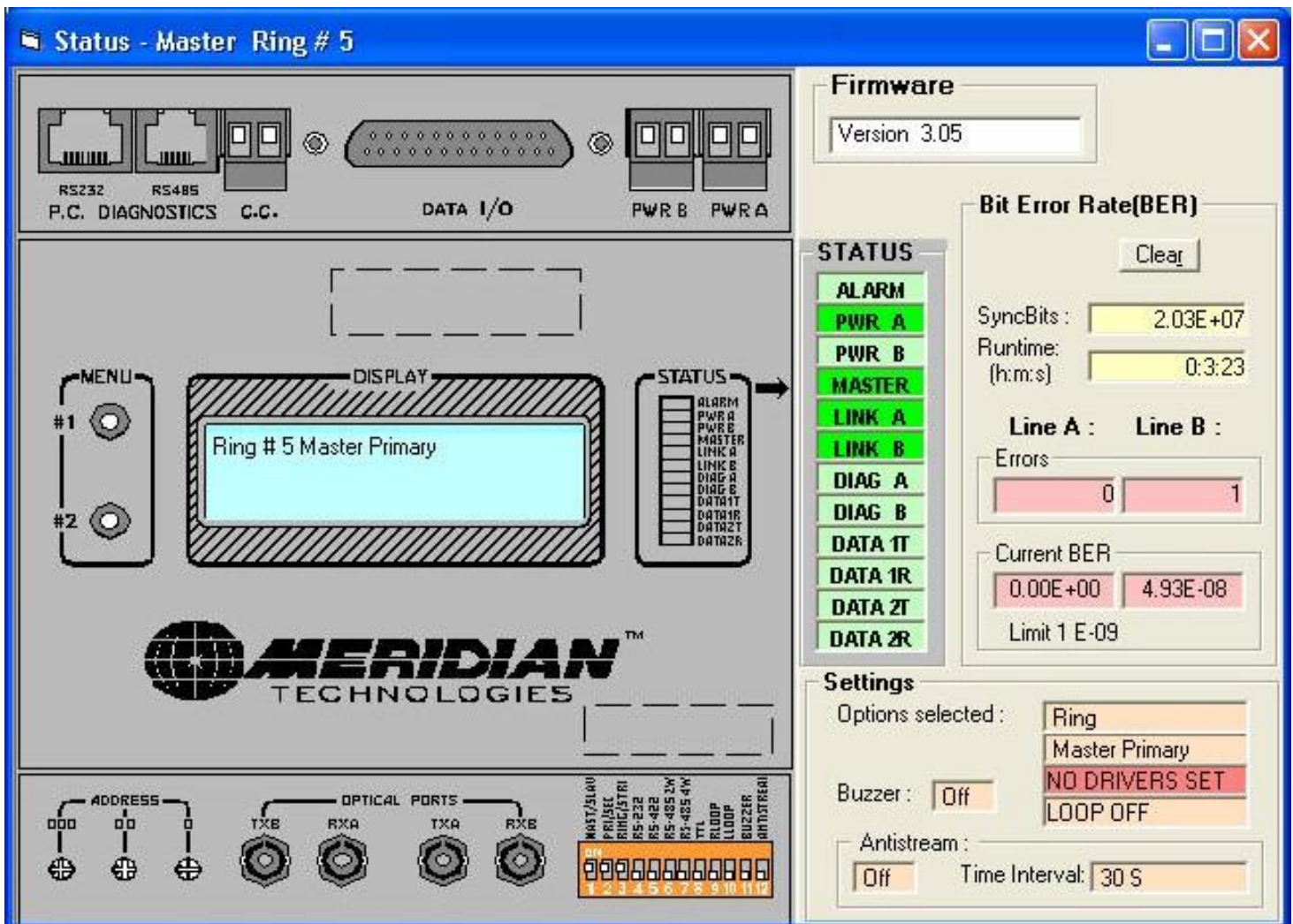
If SpectraSmart has not detected any multidrop network, the message "System doesn't detect any devices" appears on the screen.

In Manual mode the user needs to enter the number of slaves and click " OK ". This mode is important if the user suspects that the network may not have fiber continuity throughout the network.

8.1 PC Display of Remote Modem Status

Right-clicking on any of the modems on the network allows the operator to pull up the front panel display and all switch setting positions for the selected modem. Select the 'Show Modem' tab and the following typical modem front panel will be displayed on the computer.

This displays the real-time status of all of the functions of each modem. All of the DIP switch settings will be displayed so that the operator can review the configuration prior to sending a field technician out to troubleshoot any specific communication problems. Using this diagnostic mode, the operator can ensure that each of the modems have been properly configured and powered (data protocol, master/slave, power, anti-streaming, etc.). This display mode also shows the network's current Bit Error Rate (BER).



9.0 TROUBLESHOOTING

Below is a listing of some common problems and the suggested remedies for them.

- LEDs and LCD are not illuminated.
 - Check the power supply(s), power cable(s), and power connector.
- Some LEDs are lit but LCD screen has dark rectangle-shaped characters instead of letters.
 - Check LCD contrast setting
- Modem self-diagnostic does not work but data is being transmitted to remote devices.
 - Modem address is incorrect
 - Optical cable connections are incorrect
 - Check Master modem connection to diagnostic computer
 - SpectraSmart program running but net (ring or string) is not activated.
- Modem self-diagnostic shows that the modems are operating properly but the user's data is not being received properly.
 - Check DIP switch position (interface mode, loop)

If the problem with the modem/network still persists, please call Meridian's technical support staff for further assistance. When calling, please have the information about the modems and network (part #, Serial #, network architecture, etc.) available.

10.0 SPECIFICATIONS

Data Rates

Asynchronous DC - to 115 Kbps

Optical

Transmitter...	LED/Laser
Receiver	PIN Diode
Wavelength	850 or 1300 (MM) 1310 or 1550 (SM)
Fiber Optic Connectors	ST (MM) FC/ST (SM)
Loss Budget.....	15 dB (MM), 30 dB (SM)

Electrical

Data Connector	DB25F (30 micron gold pin)
Interface	RS-232 (Single Handshake)
	RS-422
	RS-485 (2-wire or 4-wire)
	TTL (2 channels)

System

Bit Error Rate	1 in 10 ⁹ or better
Visual Indicator	12 Status LED's for Alarm, PWR A, PWR B, Master, Link A, Link B, Diag A, Diag B, Data 1T, Data 1R, Data 2T, Data 2R
Dry Contact Alarm	Normally Open (N.O.) 12VDC, 0.5 A
LCD Display	16 x 2 Character Display

Power

Operating:.....12VA/DC @ 500mA or 24VA/DC @ 300mA
Input:Dual power input connectors

Temperature

Operating: -40°C to +74°C
Storage: -40°C to +85°C
Rel.Hum: 0% to 95%, (Non-condensing)

Physical

Height	1.2" (3 cm)
Width	6.0" (15.3 cm)
Depth	4.3" (11.5 cm)
Weight	1.0lbs (350 gm)

11.0 Warranty

Products manufactured by Meridian Technologies, Inc. are covered by a two- year warranty against defects in materials, workmanship, and published specifications. This warranty period starts upon field installation of the units. During the warranty period, Meridian Technologies will repair or replace, at its option, defective units provided they are returned to an authorized Meridian Technologies repair facility. Products that have been subjected to misuse, abuse, neglect, alteration, or unauthorized repair, determined at the sole discretion of Meridian Technologies are excluded from warranty coverage. Other products and accessories not manufactured by Meridian Technologies are limited to the warranty provided by the original manufacturer.

The buyer should notify Meridian Technologies, Inc. promptly in writing of any claim based upon warranty, and Meridian Technologies, Inc., at its option, may first inspect such goods at the premises of the Buyer, or may give written authorization to Buyer to return the goods to Meridian Technologies. Meridian Technologies shall not be liable for any inspection, packing or labor costs in connection with the return of goods.

To return a product, obtain a Return Material Authorization (RMA) number from the Customer Service Department. If the product's warranty has expired, you will need to provide a purchase order to authorize the repair. When returning a product for a suspected failure, please provide a description of the problem and any results of diagnostic tests that have been conducted. The shipping expense to Meridian Technologies, Inc. Should be prepaid. The product should be properly packed and insured. After repairs have been completed, Meridian Technologies, Inc. will ship the product back to the Buyer at Seller's expense.

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12.0 APPENDIX - TABLES, FIGURES

DB 25F Pin Configuration

PIN NO.	Description		
1	GND		
2	RS 232	IN 1	(TD)
3	RS 232	OUT 1	(RD)
4	RS 232	IN 2	(RTS)
5	RS 232	OUT 2	(CTS)
6	RS 232	OUT 3 *	(DSR)
7	GND		
8	RS 232	OUT 4 *	(CD)
9	RS 485	IN (-)	(2 WIRE)
10	RS 485	IN (+)	(2WIRE)
11	RS 485	OUT (-)	
12	RS 485	OUT (+)	
13	GND		
14	+5V		
15	TTL	OUT 1	
16	TTL	OUT 2	
17	TTL	IN 1	
18	TTL	IN 2	
19	GND		
20	RS 232	IN 3 *	(DTR)
21	RS 422	IN (-)	
22	RS 232	IN 4 *	(RI)
23	RS 422	IN (+)	
24	RS 422	OUT (-)	
25	RS 422	OUT (+)	

* This applies to Models with Handshake only.

Table 1

RJ45 Serial Port RS – 232 PX-2300M for Diagnostic – Pin Configuration

/ FRONT VIEW - LEFT SIDE – PIN 1 /

PIN NO.	Description	
1	N/C	
2	RX (IN)	RECEIVE DATA FROM PC
3	TX (OUT)	TRANSMIT DATA TO PC
4	DSR (IN)	DATA SET READY
5	GROUND	
6	N/C	
7	N/C	
8	N/C	

Table 2

RJ11 Serial Port RS – 485 PX-2300M for Diagnostic– Pin Configuration

/ FRONT VIEW - LEFT SIDE – PIN 1 /

PIN NO.	Description
1	ISOLATED GROUND
2	XMT - (OUT)
3	RCV +(IN)
4	RCV - (IN)
5	XMT+(OUT)
6	ISOLATED GROUND

Table 3

RJ45 Serial Port RS – 232 PX-2300R for Diagnostic - Pin Configuration

/ FRONT VIEW - LEFT SIDE – PIN 1 /

PIN NO.	Description	
1	XMT+ (OUT)	RS-485
2	RX (IN)	RS-232
3	TX (OUT)	RS-232
4	DSR (IN)	RS-232
5	GROUND	
6	XMT- (OUT)	RS-485
7	RCV- (IN)	RS-485
8	RCV+ (IN)	RS-485

Table 4

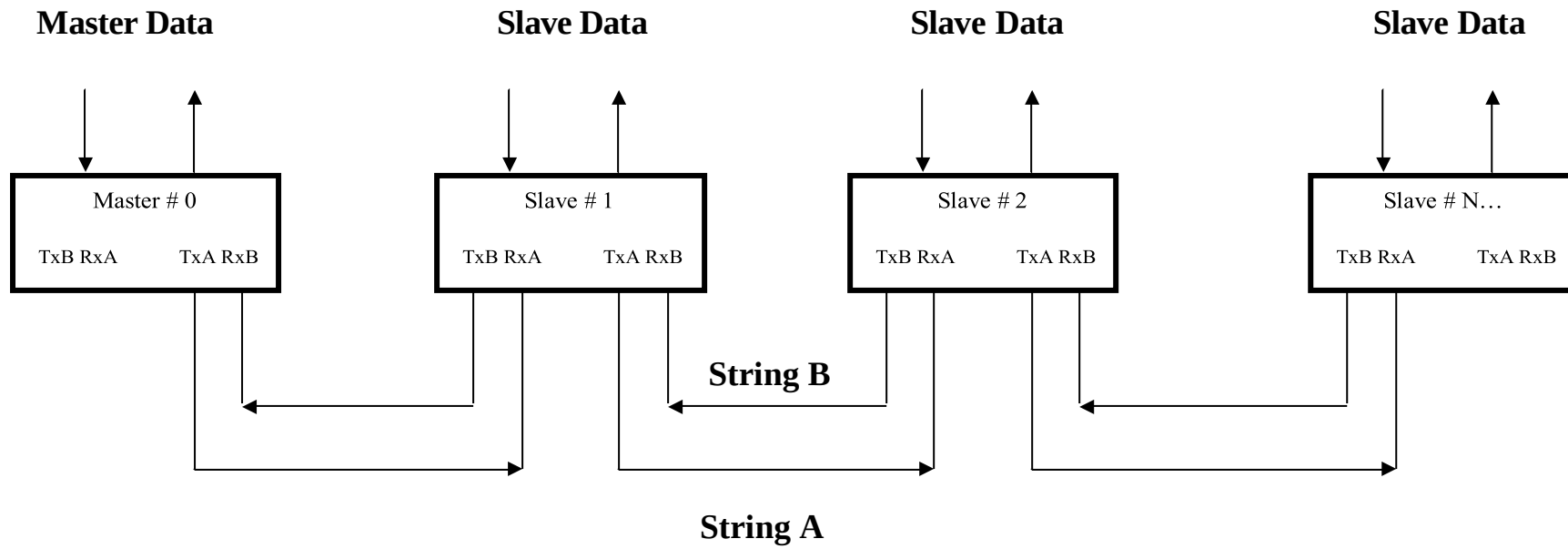


Fig. 12-1 String Configuration

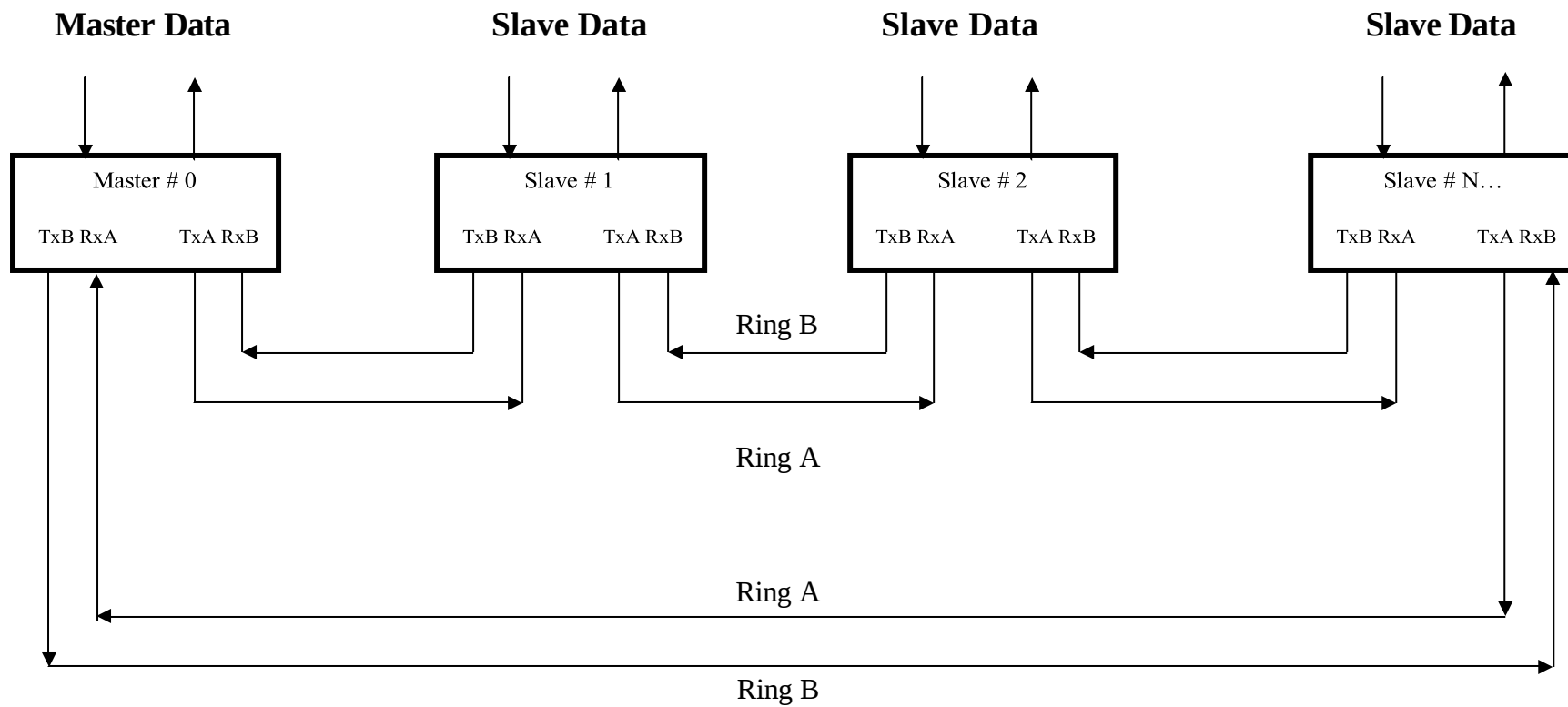


Fig. 12-2 Ring Configuration

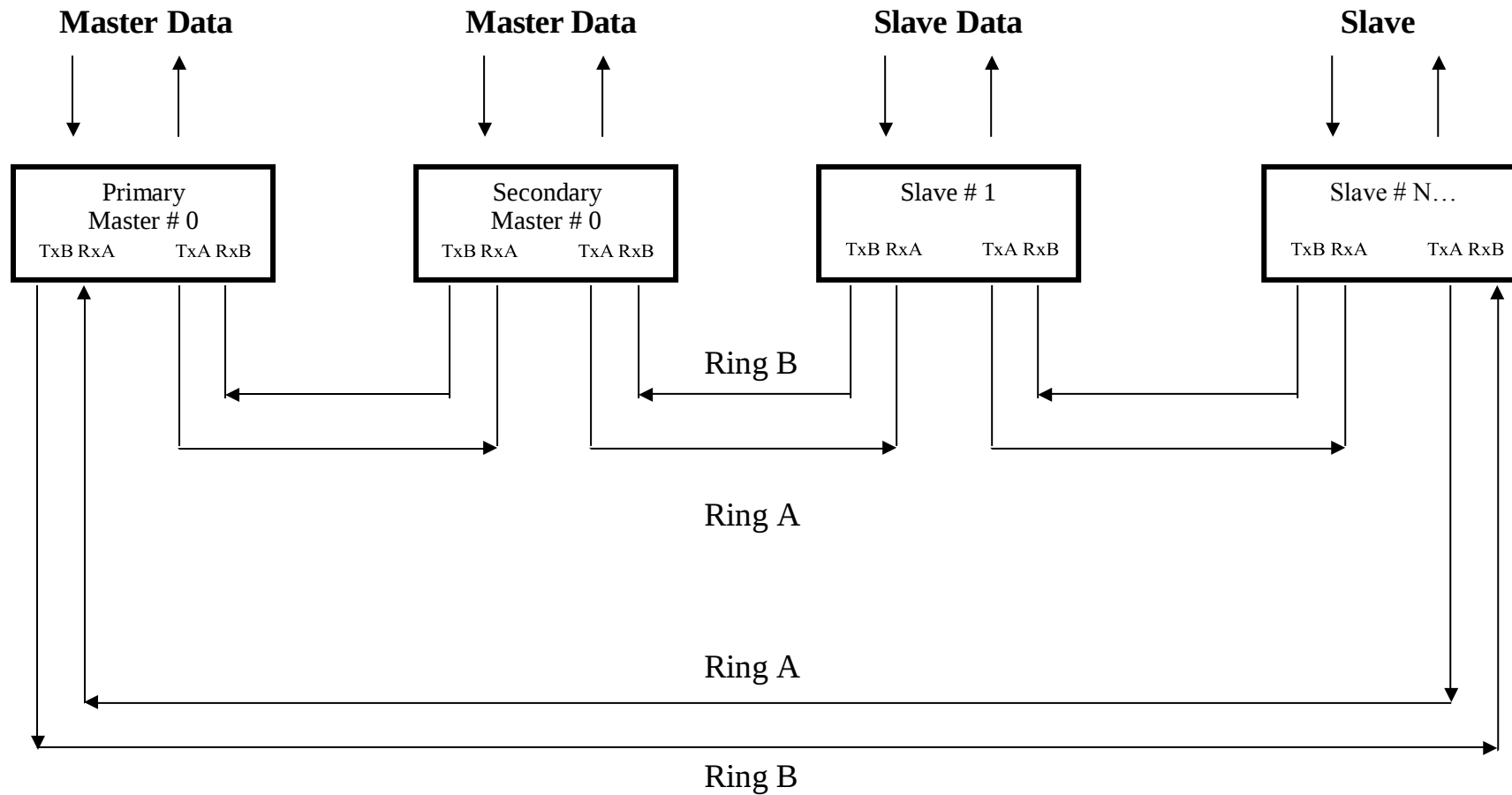


Fig. 12-3 Dual Master Ring Configuration

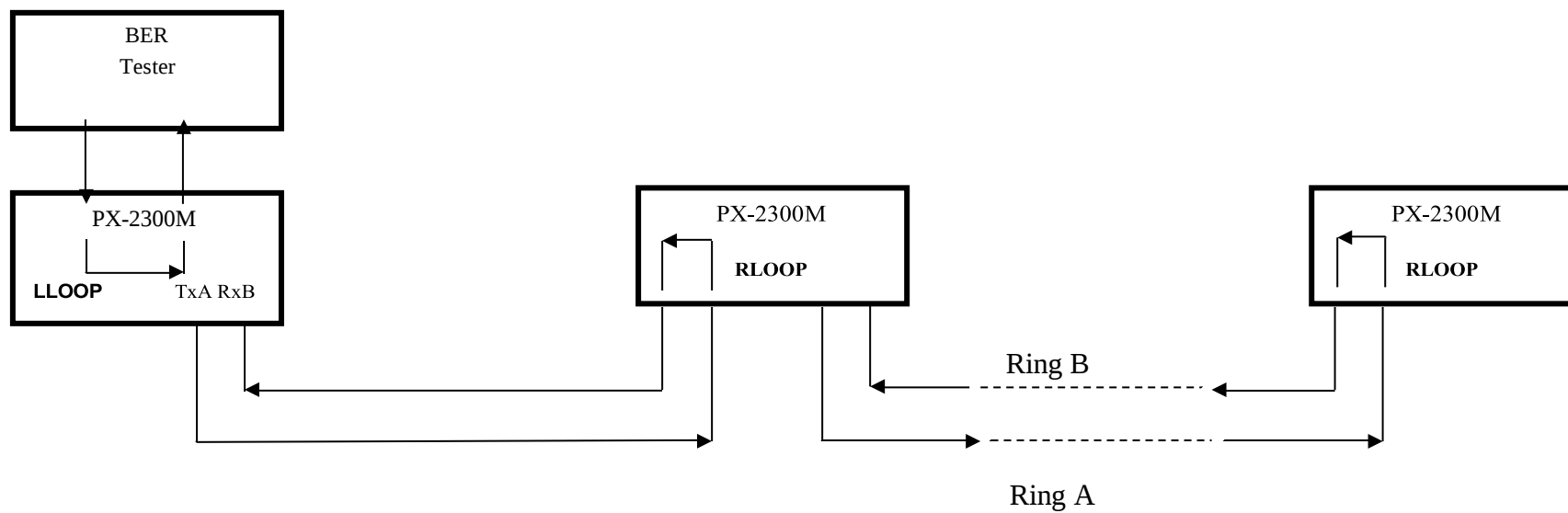


Fig. 12-4 Loop Back Operation

INTERFACE AND PIN ASSIGNMENTS

Interface mode	DIP switch (up)	DB 25 Pin Assignment	Jumper 1 JP #
RS-232 1 channel with handshake	4	2 - in1 (TD), 3 - out1 (RD), 4 - in2 (RTS) 5- out2 (CTS), 1 – GND	3A, 4A -- DCE 3B, 4B -- DTE
RS-232 2 channels without handshake	4	1 ch : 2 -- in1 (TD), 3 -- out1 (RD), 1 -- GND 2 ch : 4 -- in2(TD) , 5 -- out2 (RD), 7 -- GND	
RS-485 2 wire	6	9 -- in (-) , 10 -- in (+0) , 13 – GND	11
RS-485 4 wire	7	9 -- in(-) , 10 -- in(+) ; 11--out(-), 12 -- out(+) 13 – GND	11
RS-422	5	21 -- in(-), 23 -- in(+) ; 24 -- in(-), 25 -- out(+) 19 – GND	12
TTL 2 channels	8	1 ch : 15 -- out 1 , 17 -- in 1 , 19 -- GND 2 ch : 16 -- out 2 , 18 – in 2 , 19 -- GND	

Table 4

PC port RS-232 (DB9) and Master module PX-2300M/R (RJ45)

PC <-----> PX-2300

Pin	Signal
1	
2	RD (in)
3	TD (out)
4	DTR (out)
5	Ground
6	
7	
8	
9	

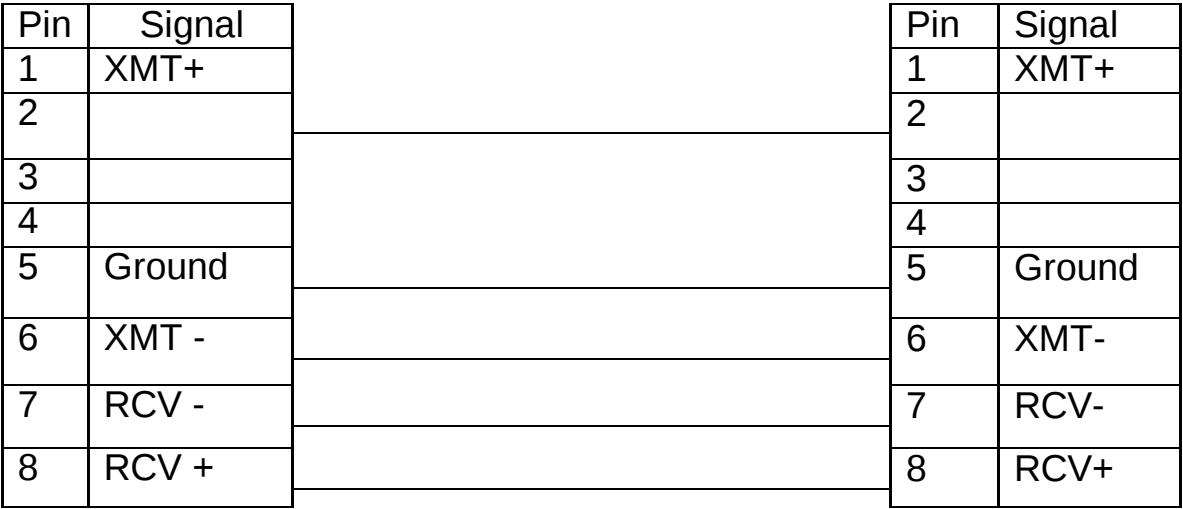
Pin	Signal
1	
2	TD (out)
3	RD (in)
4	DTR
5	Ground
6	
7	
8	

/ FRONT VIEW-LEFT SIDE-PIN1 /

Cable # 1

Connection RS-485 interface between subracks with master modules PX-2300R (RJ45)

PX-2300R(Subrack # x) <-----> PX-2300R(Subrack # x+1)



/ FRONT VIEW-LEFT SIDE-PIN1 /

Cable # 2

Connection between communication card of subrack (RJ11) with master module PX2300R (RJ45) via RS-485 interface

PX-2300R (RJ45) < ----- > Communication card (RJ11)

Pin	Signal
1	XMT+
2	
3	
4	
5	Ground
6	XMT -
7	RCV -
8	RCV +

Pin	Signal
1	
2	XMT -
3	RCV +
4	RCV -
5	XMT +
6	Ground

/ FRONT VIEW-LEFT SIDE-PIN1 /

Cable # 3

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